A 50 mm Bore Superconducting Dipole with a Unique Iron Yoke Structure. * D. DELL'ORCO, S. CASPI, A. LIETZKE, R. SCANLAN, C. TAYLOR, AND A. WANDESFORDE. Lawrence Berkeley Laboratory, Berkeley, CA 94720.---A 1 m long, two layer high field superconducting magnet was designed, built and tested at LBL. The 50 mm bore magnet reaches a short sample performance of 9.8 tesla at 1.9 K and 7.6 tesla at 4.35 K. The main features of the magnet include a two layer "cos θ" winding; 30 and 36 strand cable indentical to the cable of the 50 mm bore SSC dipole; a thin stainless steel collar, and a "close in" elliptical iron yoke in order to maximize the transfer function and minimize saturation effect on the multipoles. Since this magnet will reach 9.8 T at 1.9 K with a current of 9400 A, the mechanical structure has been designed for 10 T. During assembly the thin collar provides only a minimum prestress (10 MPa) during assembly, and the full prestress of 70 MPa is obtained using a 35 mm-thick aluminum ring and collet structure. An aluminum bar is used as an assembly tool and for control of the gap size in the vertically split iron yoke. The tapered gap in the yoke is designed to close during cooldown with no loss of coil prestress, and to remain closed when the magnet is energized. This paper presents construction details, the training behavior at 4.35 K and 1.8 K, field uniformity, and the stress-strain distribution at operating conditions.

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